

REMARKS**INTRODUCTION:**

In accordance with the foregoing, claims 1 and 18 have been amended to clarify an existing limitation as would have been understood by one of ordinary skill in the art, and have not been amended to narrow the scope of the claims. No new matter is being presented, and approval and entry are respectfully requested.

Claims 1-3, 5, 6, 8-11, and 13-21 are pending and under consideration. Reconsideration is requested.

REJECTION UNDER 35 U.S.C. §102:**1. Rejection in view of Ohno et al.**

In the Office Action at pages 2-3, the Examiner rejects claims 1 and 14-21 under 35 U.S.C. §102(b) in view of Ohno et al. (U.S. Patent No. 5,348,783). This rejection is respectfully traversed and reconsideration is requested.

On pages 2-3 of the Office Action, the Examiner asserts that the GeSbTe recording layer 2 disclosed in Ohno et al. undergoes a phase change from amorphous to crystalline states. The Examiner's characterization is that an outermost section of the recording layer 2 acts as a phase control layer "as the light used to *record the other layer(s) must pass through it*" (italics added). Even assuming arguendo that the Examiner is correct as to a change in refractive index occurring in the layers as asserted on page 3 of the Office Action, Ohno et al. does not disclose that the *reproduction beam* changes the refractive index or changes the phase of the recording layer 2. Instead, the Examiner's assertion addresses the effect of the recording of signals on layers through phase change using a recording beam.

By way of review, a recording beam is a light beam having an optical intensity sufficient to change the phase of the recording layer 2 and create a recording mark on the layer 2. A recording beam as disclosed in Ohno et al. would not be understood to have the same optical intensity as a reproducing beam, which is used to read the recorded mark without affecting the mark. Specifically, if the reproducing beam caused a phase change in the recording layer 2, the recording layer 2 would not be reproducible since each act of reproduction would erase the previously created mark. Thus, one of ordinary skill in the art would understand the distinction between a recording beam and a reproducing beam and the effect of this distinction on a phase change recording layer such as the phase change recording layer 2 in Ohno et al.

This distinction is further confirmed in the test described in col. 17, lines 7-21, of Ohno et al. In this test, the recording layer 2 is initialized using a laser beam having 10 mW power such

that the recording layer 2 is in a crystalline state. After initialization, signals are recorded onto the recording layer 2 using a laser beam having a peak level of 20 mW and a bias level of 10 mW such that parts of the crystalline recording layer 2 are changed into an amorphous state. After the signal was recorded, the layer 2 was reproduced using a light beam of 1 mW. There is no disclosure that the recording layer 2 undergoes a phase change when irradiated during reproduction. Thus, one of ordinary skill in the art would understand that a phase change recording layer 2 as disclosed in Ohno et al. records data using a recording beam, but does not record data (i.e., undergo phase changes) using a reproducing beam.

In contrast, claim 1 recites a phase change optical disc compatible with a recording beam and a reproducing beam. Among other features, the recited optical disc includes “a phase change recording layer which converts between the crystal phase and the amorphous phase *by irradiation with the recording beam.*” Claim 1 further recites “the irradiation with the *reproducing* beam of said phase control layer within the laser spot causes a *phase difference* due to one of the two areas changing between a crystal and an amorphous phase.”

In order to clarify this feature as would have been understood by one of ordinary skill in the art, claim 1 further recites that “said phase change recording layer *does not change phases when irradiated by the reproducing beam,*” and “the recording beam has a *different optical power* as compared to the reproducing beam.”

As such, it is respectfully submitted that Ohno et al. does not disclose the invention of claim 1.

For similar reasons, it is respectfully submitted that Ohno et al. does not disclose “a *phase change recording layer which converts* between the crystal phase and the amorphous phase by irradiation *with the recording beam*; and that “the irradiation of the laser spot on said *phase control layer with the reproducing beam causes a phase difference* in the plurality of areas on said phase control layer due to ones of the plurality of areas being converted between a crystalline and an amorphous state,” “said *phase change recording layer does not change phases when irradiated by the reproducing beam,*” and “the recording beam has a *different optical power* as compared to the reproducing beam” as recited in claim 18.

Similarly, it is respectfully submitted that Ohno et al. does not disclose “a *recording layer* having recording marks *to be reproduced using* the *reproducing* beam forming a first laser spot on said recording layer,” and that “the irradiation of the second laser spot on said phase control layer *causes one area of said phase control layer* within the second laser spot *to be converted between a crystalline and an amorphous state* so as to alter an optical path of a portion of the *reproducing beam* such that the second laser spot is larger than the first laser spot” as recited in

claim 21.

As a further point of clarification, on page 3 of the Office Action, the Examiner asserts that claims 5, 8, and 13 seek coverage for an embodiment in which the phase change recording layer closest to the substrate acts as a phase control layer as to the light used to record the other layer(s). Even assuming arguendo that the Examiner is correct, the coverage attributed by the Examiner is directed to the effect of a recording beam in addition to the effect of the reproduction beam as recited in claim 1. Since Ohno et al. does not disclose that the recording layer 2 changes phases for *both* a recording and a reproducing beam, even assuming arguendo that the Examiner is correct as to the coverage of these claims, Ohno et al. does not disclose that the recording layer 2 changes phases when irradiated by a reproducing beam as does the phase control layer recited in these claims.

Claims 14-17, 19, and 20 are deemed patentable due at least to their depending from corresponding claims 1 and 18.

2. Rejection in view of Kasami et al.

In the Office Action at page 4, the Examiner rejects claims 1, 2, 9-11, and 14-21 under 35 U.S.C. §102(b) in view of Kasami et al. (U.S. Patent No. 5,768,221). This rejection is respectfully traversed and reconsideration is requested.

The Examiner asserts that the SbSe phase change material and the SbTeGe, GeSbTe recording layers shown in FIG. 3 disclose the invention recited in claim 1. By way of review, Kasami et al. discloses recording layers 21 and 22 on which are focused light spots 6A and 6B. The recording layers 21 and 22 are shown in FIG. 1. The recording layers 21, 22 record information by changing phases using corresponding phase change material films 27, 30. These phase change material films 27, 30 are disclosed as changing phase when initialized and when recording the information. (Col. 2, lines 55-64, col. 3, lines 20-24). However, there is no disclosure that the phase change material films 27, 30 change phase when irradiated by a reproducing beam so as to reproduce existing information from the recording layers 21 and 22.

As such, it is respectfully submitted that Kasami et al. does not disclose "a phase change recording layer which converts between the crystal phase and the amorphous phase *by irradiation with the recording beam*" and that "the irradiation with the *reproducing* beam of said phase control layer within the laser spot causes a *phase difference* due to one of the two areas changing between a crystal and an amorphous phase" as recited in claim 1.

For similar reasons, it is respectfully submitted that Kasami et al. does not disclose the invention recited in claims 18 and 21.

Claims 2, 9-11, 14-17, 19, and 20 are deemed patentable due at least to their depending

from corresponding claims 1 and 18.

3. Rejection in view of Rosen et al.

In the Office Action at page 4, the Examiner rejects claims 1, 2, 9-11, and 14-21 under 35 U.S.C. §102(b) in view of Rosen et al. (U.S. Patent No. 5,761,188). This rejection is respectfully traversed and reconsideration is requested.

The Examiner asserts that the use of dual recording layers 90 and 92 in FIG. 3 of Rosen et al. discloses a phase control layer and a phase change recording layer as recited in claim 1. By way of review, Rosen et al. discloses an optical disk having multiple recording layers 90 and 92 which record data through phase change. However, during reproduction of data, the laser light is at a lower power so as to merely reflect from the recording layers 90, 92 without causing a phase change. (Col. 3, lines 61-66, col. 4, lines 33-37). Therefore, as was similarly found with regard to the disclosures of Ohno et al. and Kasami et al., Rosen et al. does not disclose that, when either of the recording layers 90 and 92 is irradiated with the light spot during *reproduction*, the recording layer 90 or 92 within the light spot undergoes a state change.

As such, it is respectfully submitted that Rosen et al. does not disclose "a phase change recording layer which converts between the crystal phase and the amorphous phase by *irradiation with the recording beam*" and that "the irradiation with the *reproducing* beam of said phase control layer within the laser spot causes a *phase difference* due to one of the two areas changing between a crystal and an amorphous phase" as recited in claim 1.

For similar reasons, it is respectfully submitted that Rosen et al. does not disclose the invention recited in claims 18 and 21.

Claims 2, 9-11, 14-17, 19, and 20 are deemed patentable due at least to their depending from corresponding claims 1 and 18.

4. Rejection in view of Miyauchi et al.

In the Office Action at page 5, the Examiner rejects claims 1, 2, 9-11, and 14-21 under 35 U.S.C. §102(b) in view of Miyauchi et al. (Japanese Patent Publication No. 09-007224). This rejection is respectfully traversed and reconsideration is requested.

The Examiner asserts that the use of recording films 4, 6, 8 in FIG. 1 of Miyauchi et al. discloses a phase control layer and a phase change recording layer as recited in claim 1. By way of review, Miyauchi et al. discloses an optical disk having multiple recording films 4, 6, 8. During recording, each of the recording films 4, 6, 8 undergoes a phase transition so as to record information due to the irradiation by energy beams. (Abstract of Miyauchi et al.) However, as was similarly found with respect to the disclosures of Ohno et al., Kasami et al., and

Rosen et al., Miyauchi et al. does not disclose that, when the recording films 4, 6, 8 are irradiated during *reproduction*, the recording films 4, 6, 8 undergo a state change.

As such, it is respectfully submitted that Miyauchi et al. does not disclose "a phase change recording layer which converts between the crystal phase and the amorphous phase by *irradiation with the recording beam*" and that "the irradiation with the *reproducing* beam of said phase control layer within the laser spot causes a *phase difference* due to one of the two areas changing between a crystal and an amorphous phase" as recited in claim 1.

For similar reasons, it is respectfully submitted that Miyauchi et al. does not disclose the invention recited in claims 18 and 21.

Claims 2, 9-11, 14-17, 19, and 20 are deemed patentable due at least to their depending from corresponding claims 1 and 18.

5. Rejection in view of Akahira et al.

In the Office Action at page 5, the Examiner rejects claims 1, 2, 9-11, and 14-21 under 35 U.S.C. §102(b) in view of Akahira et al. (Japanese Patent Publication No. 03-157830). This rejection is respectfully traversed and reconsideration is requested.

The Examiner asserts that the use of recording thin film layers 3 and 5 of Akahira et al. discloses a phase control layer and a phase change recording layer as recited in claim 1. By way of review, Akahira et al. discloses an optical disk having recording thin film layers 3 and 5 which use phase changes when recording, erasing, or rewriting. (Abstract of Akahira et al.) However, as was similarly found with respect to the disclosures of Ohno et al., Kasami et al., Rosen et al., and Miyauchi et al., Akahira et al. does not disclose that, when the recording thin film layers 3 and 5 are irradiated during *reproduction*, the recording thin film layers 3 and 5 undergo a state change.

As such, it is respectfully submitted that Akahira et al. does not disclose "a phase change recording layer which converts between the crystal phase and the amorphous phase by *irradiation with the recording beam*" and that "the irradiation with the *reproducing* beam of said phase control layer within the laser spot causes a *phase difference* due to one of the two areas changing between a crystal and an amorphous phase" as recited in claim 1.

For similar reasons, it is respectfully submitted that Akahira et al. does not disclose the invention recited in claims 18 and 21.

Claims 2, 9-11, 14-17, 19, and 20 are deemed patentable due at least to their depending from corresponding claims 1 and 18.

REJECTION UNDER 35 U.S.C. §103:

1. Rejection in view of Tsukagoshi et al. and Kasami et al., Rosen et al., Miyauchi et al., or Akahira et al.

In the Office Action at page 5, the Examiner rejects claims 1-3, 6, 9-11, and 14-21 under 35 U.S.C. §103 in view of Tsukagoshi et al. (U.S. Patent No. 5,981,014) and Kasami et al., Rosen et al., Miyauchi et al., or Akahira et al. This rejection is respectfully traversed and reconsideration is requested.

The Examiner asserts that Tsukagoshi et al. discloses a dielectric layer disposed between a reflective layer and a UV cured layer. Even assuming arguendo that the Examiner is correct, it is respectfully submitted that Tsukagoshi et al. does not cure the above noted deficiencies of Kasami et al., Rosen et al., Miyauchi et al., or Akahira et al. as applied to the claims as discussed above in relation to the rejections under 35 U.S.C. §102. As such, it is respectfully submitted that the combinations of Tsukagoshi et al. and Kasami et al., Rosen et al., Miyauchi et al., or Akahira et al. do not disclose or suggest the invention recited in claims 1-3, 6, 9-11, and 14-21.

2. Rejection in view of Coombs et al. and Yamada et al.

In the Office Action at pages 6-7, the Examiner rejects claims 1, 2, 8-11, and 14-21 under 35 U.S.C. §103 in view of Coombs et al. (U.S. Patent No. 5,604,003) and Yamada et al. (U.S. Patent No. 5,255,260). This rejection is respectfully traversed and reconsideration is requested.

By way of review, Coombs et al. discloses an optical information carrier having layers of material in an MIPIM structure. In Example 2, the MIPIM structure includes a reflective layer 5 of Au, a dielectric layer 7 of Ta₂O₅, a recording layer 9 of Ge₅₀Te₂₅Se₂₅, a dielectric layer 11 of Ta₂O₅, and a reflective layer 13 of Au. (Col. 3, lines 8-26, col. 5, lines 7-20, col. 8, lines 9-28; FIG. 4). One of the reflection layers 5 and 13 is disclosed as being fully reflective, while the other is disclosed as being semi-transparent. (Col. 3, lines 23-26). Thus, when irradiated by a laser-light beam a, some of the light beam a passes through the semi-transparent reflective layer 5 in order to form a light spot on the recording layer 9 as shown in FIG. 4.

The recording layer 9 is disclosed as undergoing a phase change during inscribing and erasing. (Col. 8, lines 40-58, col. 9, lines 40-43 of Coombs et al.) However, as was also similarly found with regard to the disclosures in Kasami et al., Rosen et al., Miyauchi et al., and Akahira et al., Coombs et al. does not disclose that the recording layer 9 or the remaining layers 5, 7, 11, and 13 undergo a phase change during reproduction.

While the Examiner relies upon Yamada et al. as disclosing a phase change recording medium including InSbTe and GeSbTe and a reflective layer including Ni, Al, Au, and Cu, it is noted that the phase change recording medium is also disclosed as only undergoing phase changes during recording and overwriting, but not during reproduction. (Col. 8, lines 34-40, col. 11, lines 47-68, col. 13, lines 3-28, col. 14, lines 10-35 of Yamada et al.)

As such, it is respectfully submitted that the combination of Coombs et al. and Yamada et al. does not disclose or suggest "a phase change recording layer which converts between the crystal phase and the amorphous phase *by irradiation with the recording beam*" and that "the irradiation with the *reproducing* beam of said phase control layer within the laser spot causes a *phase difference* due to one of the two areas changing between a crystal and an amorphous phase" as recited in claim 1.

For similar reasons, it is respectfully submitted that the combination of Coombs et al. and Yamada et al. does not disclose or suggest the invention recited in claims 18 and 21.

Claims 2, 8-11, 14-17, 19, and 20 are deemed patentable due at least to their depending from corresponding claims 1 and 18.

3. Rejection in view of Coombs et al., Yamada et al., and Tsukagoshi et al.

In the Office Action at page 7, the Examiner rejects claims 1-3, 6, 8-11, and 14-21 under 35 U.S.C. §103 in view of Coombs et al., Yamada et al., and Tsukagoshi et al. This rejection is respectfully traversed and reconsideration is requested.

The Examiner asserts that Tsukagoshi et al. discloses a dielectric layer disposed between a reflective layer and a UV cured layer. Even assuming arguendo that the Examiner is correct, it is respectfully submitted that Tsukagoshi et al. does not cure the above noted deficiencies of the combination of Coombs et al. and Yamada et al. as applied to the claims as discussed above. As such, it is respectfully submitted that the combination of Coombs et al., Yamada et al., and Tsukagoshi et al. does not disclose or suggest the invention recited in claims 1-3, 6, 8-11, and 14-21.

4. Rejection in view of Yamada et al., Tsukagoshi et al., and Kasami et al., Rosen et al., Miyauchi et al., or Akahira et al.

In the Office Action at page 7, the Examiner rejects claims 1-3, 5, 6, 9-11, and 13-21 under 35 U.S.C. §103 in view of Yamada et al., Tsukagoshi et al. and Kasami et al., Rosen et al., Miyauchi et al., or Akahira et al. This rejection is respectfully traversed and reconsideration is requested.

The Examiner asserts that Tsukagoshi et al. discloses a dielectric layer disposed

between a reflective layer and a UV cured layer. Even assuming arguendo that the Examiner is correct, it is respectfully submitted that Tsukagoshi et al. does not cure the above noted deficiencies of the combinations of Yamada et al. and Kasami et al., Rosen et al., Miyauchi et al., or Akahira et al. as applied to the claims as discussed above. As such, it is respectfully submitted that the combinations of Yamada et al. and Tsukagoshi et al. and Kasami et al., Rosen et al., Miyauchi et al., or Akahira et al. do not disclose or suggest the invention recited in claims 1-3, 5, 6, 9-11, and 13-21.

ATTACHMENT:

Attached hereto is a "Version With Markings to Show Changes Made," comprising a marked-up version of changes made to the Claims by the current amendment.

CONCLUSION:

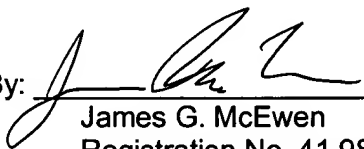
In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot. And further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited and possibly concluded by the Examiner contacting the undersigned attorney for a telephone interview to discuss any such remaining issues.

If there are any additional fees associated with the filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

By: 
James G. McEwen
Registration No. 41,983

700 Eleventh Street, N.W.
Suite 500
Washington, D.C. 20001
Telephone: (202) 434-1500
Facsimile: (202) 434-1501

Date: April 4, 2003

VERSION WITH MARKING TO SHOW CHANGES MADE

IN THE CLAIMS:

Please **AMEND** claims 1 and 18 as follows. The remaining claims are reprinted, as a convenience to the Examiner, as they presently stand before the U.S. Patent and Trademark Office.

1. (FOUR TIMES AMENDED) A phase change optical disc compatible with a recording beam and a reproducing beam, comprising:

- a transparent substrate;
- at least one first dielectric layer thinly formed on said transparent substrate;
- a phase change recording layer which converts between the crystal phase and the amorphous phase by irradiation with the recording beam;
- a reflective layer; and
- a phase control layer disposed between said transparent substrate and said phase change recording layer, said phase control layer having two areas defined in a laser spot, the laser spot defined by where the reproducing beam is incident to said phase control layer, wherein:

- the irradiation with the reproducing beam of said phase control layer within the laser spot causes a phase difference due to one of the two areas changing between a crystal and an amorphous phase that alters an optical path of the reproducing beam reflected from said phase change recording layer so as to prevent portions of the reproducing beam reflected from said phase change recording layer from passing through the one area that has converted between the crystalline and the amorphous state,

- said phase change recording layer does not change phases when irradiated by the reproducing beam,

- the recording beam has a different optical power as compared to the reproducing beam, and

- the phase control layer comprises a material selected from the group consisting essentially of GeSbTe, InSbTe, and Ni.

2. (NOT AMENDED) The phase change optical disc of claim 1, further comprising:

- a second dielectric layer;
- a third dielectric layer; and

a protective layer;
wherein said first dielectric layer, said phase control layer, said second dielectric layer, said phase change recording layer, said third dielectric layer, said reflective layer, and said protective layer are sequentially laminated on said transparent substrate.

3. (NOT AMENDED)The phase change optical disc of claim 2, further comprising a fourth dielectric layer disposed between said reflective layer and said protective layer.

4. (PREVIOUSLY CANCELED)

5. (AS THREE TIMES AMENDED)The phase change optical disc of claim 1, wherein said phase control layer is InSbTe.

6. (NOT AMENDED)The phase change optical disc of claim 3, wherein one of the two areas defined on said phase control layer has a phase difference, which alters an optical path of the reproducing beam reflected from said phase change recording layer, that substantially has a minimum value of 0 degrees, and the other area has a phase difference, which alters an optical path of the reproducing beam reflected from said phase change recording layer, that substantially has a maximum value of 180 degrees.

7. (PREVIOUSLY CANCELED)

8. (AS THREE TIMES AMENDED)The phase change optical disc of claim 1, wherein said phase control layer is Ni.

9. (NOT AMENDED)The phase change optical disc of claim 2, wherein one of the two areas defined on said phase control layer has a phase difference, which alters an optical path of the reproducing beam reflected from said phase change recording layer, that substantially has a minimum value of 0 degrees, and the other area has a phase difference, which alters an optical path of the reproducing beam reflected from said phase change recording layer, that substantially has a maximum value of 180 degrees.

10. (NOT AMENDED)The phase change optical disc of claim 2, wherein each of said first, second, and third dielectric layers is formed of a material selected from the group consisting essentially of Al_2O_3 , ZnS-SiO_2 , Si_3N_4 , SiO_2 , MgF_2 , NaF_2 , LiF_2 , CaF_2 , and AlF_2 .

11. (AS TWICE AMENDED)The phase change optical disc of claim 2, wherein said phase change recording layer comprises a material selected from the group consisting essentially of GeSbTe , InSbTe , and AgInSbTe .

12. (PREVIOUSLY CANCELED)

13. (AS THREE TIMES AMENDED)The phase change optical disc of claim 11, wherein the phase control layer is InSbTe .

14. (NOT AMENDED)The phase change optical disc of claim 1, wherein one of the two areas defined on said phase control layer has a phase difference, which alters an optical path of the reproducing beam reflected from said phase change recording layer, that substantially has a minimum value of 0 degrees, and the other area has a phase difference, which alters an optical path of the reproducing beam reflected from said phase change recording layer, that has a maximum value of 180 degrees.

15. (AS TWICE AMENDED)The phase change optical disc of claim 1, wherein said phase change recording layer comprises a material selected from the group consisting essentially of GeSbTe , InSbTe , and AgInSbTe .

16. (NOT AMENDED)The phase change optical disc of claim 1, wherein each of said first, second, and third dielectric layers is formed of a material selected from the group consisting essentially of Al_2O_3 , ZnS-SiO_2 , Si_3N_4 , SiO_2 , MgF_2 , NaF_2 , LiF_2 , CaF_2 , and AlF_2 .

17. (NOT AMENDED)The phase change optical disc of claim 1, wherein said reflective layer is formed of a material selected from the group consisting essentially of Al , Al-Ti , Cu , Au , and alloys of any of the above.

18. (FOUR TIMES AMENDED) A phase change optical disc compatible with a recording beam and having multiple layers formed on a transparent substrate, the multiple layers including a reflective layer, comprising:

a phase change recording layer which converts between the crystal phase and the amorphous phase by irradiation with the recording beam; and

a phase control layer disposed between the transparent substrate and said phase change recording layer, said phase control layer having a plurality of areas defined in a laser spot, the laser spot defined by where the reproducing beam is incident to said phase control layer,

wherein:

the irradiation of the laser spot on said phase control layer with the reproducing beam causes a phase difference in the plurality of areas on said phase control layer due to ones of the plurality of areas being converted between a crystalline and an amorphous state that alters an optical path of the reproducing beam reflected from said phase change recording layer so as to prevent portions of the reproducing beam reflected from said phase change recording layer from passing through the ones of the areas that have converted between the crystalline and the amorphous state,

said phase change recording layer does not change phases when irradiated by the reproducing beam,

the recording beam has a different optical power as compared to the reproducing beam, and

the phase control layer comprises a material selected from the group consisting essentially of GeSbTe, InSbTe, and Ni..

19. (NOT AMENDED) The phase change optical disc of claim 18, wherein a material that forms said phase control layer defines the plurality of areas based upon a temperature profile of the material during irradiation by the reproduction beam.

20. (NOT AMENDED) The phase change optical disc of claim 18, wherein the plurality of areas comprise at least one area that has a phase difference, which alters an optical path of the reproducing beam reflected from said phase change recording layer, that substantially has a value of 0 degrees, and at least one other area which has a phase difference, which alters an optical path of the reproducing beam reflected from said phase change recording layer, that substantially which substantially has a value of 180 degrees.

21. (AS ONCE AMENDED) An optical disc compatible with a reproducing beam and having multiple layers formed on a transparent substrate, comprising:

a recording layer having recording marks to be reproduced using the reproducing beam forming a first laser spot on said recording layer; and

a phase control layer disposed between the transparent substrate and said recording layer upon which the reproducing beam forms a second laser spot,

wherein:

the irradiation of the second laser spot on said phase control layer causes one area of said phase control layer within the second laser spot to be converted between a crystalline and an amorphous state so as to alter an optical path of a portion of the reproducing beam such that the second laser spot is larger than the first laser spot, and

the phase control layer comprises a material selected from the group consisting essentially of GeSbTe, InSbTe, and Ni.